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Research Design

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Design Characteristics

- Maximizes control over factors to increase the validity of the findings
- Guides the researcher in planning and implementing a study
Level of Control: Quantitative Research

- Descriptive
- Correlational
- Quasi-experimental
- Experimental

Increased Control with Design
Concepts Relevant to Research Design (1)

Causality
A \rightarrow B
Pressure \rightarrow Ulcer

Multicausality
Years smoking \rightarrow Heart disease
High fat diet \rightarrow Heart disease
Limited exercise \rightarrow Heart disease
Concepts Relevant to Research Design (2)

- Probability: Likelihood of an outcome
- Bias: Slanting findings
- Manipulation: Treatment
- Control: All phases of design
Design Validity

- Measure of accuracy of a study

- Examined with critique of the following dimensions:
  - Statistical conclusion validity
  - Internal validity
  - Construct validity
  - External validity
Elements of a Strong Research Design (1)

- Controlling the environment of the study setting

- Levels of controlling:
  - Natural setting
  - Partially controlled setting: e.g., clinics
  - Highly controlled setting: e.g., laboratory
Elements of a Strong Research Design (2)

- Controlling the equivalence of subjects and groups
  - Random subject selection
  - Random assignment to groups
Elements of a Strong Research Design (3)

- Controlling the treatment
  - Choose a treatment based on research and practice
  - Develop a protocol for implementation
  - Document the implemented treatment
  - Use a check-list to determine the extent of completeness to which the treatment was implemented
  - Evaluate the treatment during the study
Elements of a Strong Research Design (4)

• **Controlling measurement**
  - Reliability
  - Validity
  - Number of measurement methods
  - Types of instruments
Elements of a Strong Research Design (5)

- Controlling extraneous variables
  - Identify and eliminate extraneous variables via sample criteria, choice of settings, or research design
  - Random sampling
  - Sample: Heterogenous, homogeneous, or matching
  - Statistical control
Problems with Study Designs

- Inappropriate for the study purpose or the research framework
- Poorly developed designs
- The research methods were poorly implemented
- Inadequate treatment, sample, or measurement methods
Selecting a Design

- **Is there a treatment?**
  - No
  - Yes
    - **Is the primary purpose examination of relationships?**
      - No
      - Yes
        - Descriptive Design
        - Will the sample be studied as a single group?
          - No
          - Yes
            - Quasi-Experimental Study
            - Will a randomly assigned control group be used
              - No
              - Yes
                - Is the original sample randomly selected?
                  - No
                  - Yes
                    - Experimental Study
Selecting a Descriptive Design

- Examining sequences across time?
  - No
    - One Group?
      - No
        - Comparative Descriptive Design
      - Yes
        - Descriptive Design
  - Yes
    - Following same subjects across time?
      - No
        - Data collected across time
        - No
          - Cross-sectional design
          - Yes
            - Studying events partitioned across time?
              - No
                - Trend Analysis
              - Yes
                - Repeated measures of each subject
      - Yes
        - Single unit of study
        - No
          - Longitudinal Study
          - Yes
            - Case Study

Research Design

Cross-sectional design with treatment partitioning

Longitudinal design with treatment partitioning
A Typical Descriptive Design

Clarification ➔ Measurement ➔ Description ➔ Interpretation

Phenomenon of Interest

Variable 1
Description of Variable 1

Variable 2
Description of Variable 2

Variable 3
Description of Variable 3

Variable 4
Description of Variable 4

Interpretation of Meaning

Development of Hypotheses
A Comparative Descriptive Design

Group I {variables measured} → Describe → Comparison of Groups on Selected Variables → Interpretation of Meaning → Development of Hypotheses

Group II {variables measured} → Describe
Selecting the Type of Correlational Design

<table>
<thead>
<tr>
<th>Describe relationships between/among variables?</th>
<th>Predict relationships between/among variables?</th>
<th>Test theoretically proposed Relationships?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Descriptive correlational design</td>
<td>Predictive correlational design</td>
<td>Model testing design</td>
</tr>
</tbody>
</table>

Research Design
A Descriptive Correlational Design

Measurement

Research Variable 1

Description of variable

Examination of relationship

Interpretation of Meaning

Description of variable

Development of Hypotheses

Research Variable 2
A Predictive Design

Value of Intercept + Value of Independent Variable 1 + Value of Independent Variable 2 = Predicted Value of Dependent Variable
Selecting The Type of Quasi-Experimental Design

Control Group?
- No
  - Pretest?
    - No
      - One-group post-test only design
    - Yes
      - Repeated Measures?
        - No
          - Comparison with population values?
        - Yes
          - Strategy for Comparison
            - No
              - Suggest Reevaluating design
            - Yes
              - Compare treatment & control conditions?
  - Yes
    - Pretest?
      - No
        - Repeated Measures?
          - No
            - Strategy for Comparison
          - Yes
            - Repeated Measures?
Selecting The Type of Experimental Design

- Pretest
  - No
    - Post-test only control group design
  - Yes
    - Repeated Measurements?
      - No
        - Examine effects of confounding variables?
          - No
            - Multiple sites?
              - Pretest/post-test control group design
              - Randomized clinical trials
            - Yes
              - Blocking?
                - No
                  - Comparison of multiple levels of treatment
                  - Examination of complex relationships among variables in relation to treatment
                - Yes
                  - Randomized Block Design
                  - Nested Designs
  - Yes
    - Repeated measures design
# Pretest-Post Test, Control Group Designs

<table>
<thead>
<tr>
<th>Randomly selected experimental group</th>
<th>Measurement of dependent variables</th>
<th>Manipulation of independent variables</th>
<th>Measurement of dependent variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Randomly selected control group</td>
<td>PRETEST</td>
<td>TREATMENT</td>
<td>POST-TEST</td>
</tr>
</tbody>
</table>

**Treatment:** Under control of researcher

**Findings:**
- Comparison of pretest and post-test scores
- Comparison of experimental and control groups
- Comparison of pretest-post-test differences between samples

**Example:** Your self (1990). The impact of group reminiscence counseling on a depressed elderly population.

**Uncontrolled threats to validity:**
- Testing
- Mortality

**Instrumentation:** Restricted generalizability as control increases
## Post-Test-Only Control Group Design

<table>
<thead>
<tr>
<th>Randomly selected experimental group</th>
<th>Treatment (TREATMENT)</th>
<th>POST-TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Randomly selected control group</td>
<td></td>
<td>POST-TEST</td>
</tr>
</tbody>
</table>

### Measurement of independent variables
### Measurement of dependent variables

- **Treatment:** Under control of researcher
- **Findings:** Comparison of experimental and control groups
- **Uncontrolled threats to validity:** Instrumentation, Mortality, Limited generalizability as control increases
### Pain Control Management

<table>
<thead>
<tr>
<th>Traditional care</th>
<th>PRN Medication</th>
<th>New approach: “Around the clock” medication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit A</td>
<td>Unit E</td>
<td>Unit E</td>
</tr>
<tr>
<td>Unit B</td>
<td>Unit F</td>
<td>Unit F</td>
</tr>
<tr>
<td>Unit C</td>
<td>Unit G</td>
<td>Unit G</td>
</tr>
<tr>
<td>Unit D</td>
<td>Unit H</td>
<td>Unit H</td>
</tr>
</tbody>
</table>

#### Primary Nursing Care

<table>
<thead>
<tr>
<th>Unit A</th>
<th>Unit B</th>
<th>Unit C</th>
<th>Unit D</th>
<th>Unit E</th>
<th>Unit F</th>
<th>Unit G</th>
<th>Unit H</th>
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</tbody>
</table>

#### Primary Care vs. No Primary Care

- **Primary Care**
  - Unit A
  - Unit B
  - Unit C
  - Unit D
  - Unit E
  - Unit F
  - Unit G
  - Unit H

- **No Primary Care**
  - Unit A
  - Unit B
  - Unit C
  - Unit D
  - Unit E
  - Unit F
  - Unit G
  - Unit H
Advantages of Experimental Designs

- More controls in design and conducting a study
- Increased internally validity
  - Decreased threats to design validity
- Fewer rival hypotheses
Advantages of Quasi-Experimental Designs

- **More practical**
  - Ease of implementation
- **More feasible**
  - Resources, subjects, time, setting
- **More generalizable**
  - Comparable to practice
Developing the Design Section of Your Proposal

- Identify the design
  - Name it specifically

- Provide a map of the design
- Discuss your rationale for using this design
- Describe threats to the validity of the chosen design